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Bakker, Ellen J M; Kox, Jos H A M; Boot, Cécile R L; Francke, Anneke L; van der Beek, Allard J; Roelofs, Pepijn D D M

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REVIEW PAPER

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Improving mental health of student and novice nurses to prevent dropout: A systematic review

Ellen J. M. Bakker RN, MSc, PhD candidate[1,2] | Jos H. A. M. Kox RN, MCommH, PhD candidate[1,4] | Cécile R. L. Boot PhD, Full Professor[2,5] | Anneke L. Francke PhD, Full Professor[2,3] | Allard J. van der Beek PhD, Full Professor[2] | Pepijn D. D. M. Roelofs PhD, Assistant Professor[1,6]

[1]Research Centre Innovations in Care, Rotterdam University of Applied Sciences, Rotterdam, The Netherlands

[2]Department of Public and Occupational Health, Amsterdam Public Health Research Institute, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands

[3]NIVEL Netherlands Institute for Health Services Research, Utrecht, The Netherlands

[4]Department of General Practice, Erasmus University Medical Centre, Rotterdam, The Netherlands

[5]Behavioural Science Institute, Radboud University Nijmegen, Nijmegen, The Netherlands

[6]Department of Health Sciences, Community and Occupational Medicine, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands

Correspondence
Ellen Bakker, Rotterdam University of Applied Sciences, Research Centre Innovations in Care, P.O. Box 25035, 3001 HA Rotterdam, The Netherlands.
Email: e.j.m.bakker@hr.nl

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Abstract

Aims: To provide: (a) an overview of interventions aimed at improving mental health of student or novice nurses; and (b) an evaluation of their effectiveness on dropout-related outcomes.

Design: Systematic review.

Data sources: Research papers published between January 1971–February 2019 were identified from the following databases: Embase, Medline, PsycInfo, CINAHL, ERIC, the Cochrane Library, Web of Science, and Google Scholar.

Review methods: We followed the procedures recommended by the Editorial Board of the Cochrane Collaboration Back Review Group. We included peer-reviewed articles with a quantitative research design, examining interventions aimed at improving mental health of student and novice nurses and their effect on dropout-related outcomes. The large variation in studies prohibited statistical pooling and a synthesis without meta-analysis of studies was performed.

Results: We identified 21 studies with three areas of focus: managing stress or stressors ($N = 4$); facilitating the transition to nursing practice ($N = 14$); and a combined approach ($N = 3$). Five studies showed a statistically significant effect on dropout-related outcomes. The overall risk of bias was high.

Conclusion: A wide range of interventions are available, but the evidence for their effectiveness is limited. There is a need for high-quality studies in this field, preferably with a randomized controlled design.

KEYWORDS

attrition, dropout, mental health, novice nurse, nursing, student nurse, systematic review, turnover

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1 | INTRODUCTION

More healthcare professionals are needed in many western countries, due to increasing healthcare demands in ageing populations plus a declining working population (Wismar, Maier, Sagan, & Glinos, 2018). The European Commission expects that by 2020 one in seven vacancies for nurses in Europe will not be filled (de Jong et al., 2014) and estimates show those shortages will persist through 2030 (WHO, 2020). Besides these population trends, work-related factors cause shortages of nurses. Various studies unambiguously show that (novice) nurses frequently experience not only a high physical workload (e.g., Andersen et al., 2014; Lövgren, Gustavsson, Melin, & Rudman, 2014) but also a high mental workload leading to emotional exhaustion and eventually to burnout (Monsalve-Reyes et al., 2018), productivity loss at work, sickness absence (de Jong et al., 2014; Ketelaar et al., 2014), and intention to leave the nursing profession (Hasselhorn, Müller, & Tackenberg, 2005; Moloney, Boxall, Parsons, & Cheung, 2018).

What problem did the study address?

- Significant levels of depression, anxiety, and distress are found in student and novice nurses and may contribute to dropout.
- An evaluation of available interventions is lacking.

What were the main findings?

- Five from the 21 studies showed a statistically significant effect on dropout-related outcomes.
- The overall risk of bias was high.

Where and on whom will the research have impact?

- There is limited evidence for the effects of interventions aimed at improving mental health to prevent dropout of student and novice nurses.
- The global lack of nurses demands high-quality studies in this field.

2 | BACKGROUND

Substantial dropout (i.e., voluntary or involuntary exit) among student nurses is found in various countries: for example, 9% in Finland (Kukkonen, Suhonen, & Salminen, 2016), 17% in the Netherlands (Vereniging Hogescholen, 2020), and up to 42% in Australia (Gaynor et al., 2007). Similarly, dropout can be high among novice nurses; for example, 13% in the USA (Kovner et al., 2007). Many student and novice nurses suffer from mental health problems; several studies report significant levels of depression, anxiety, distress, or burnout (e.g., Chatterjee et al., 2014; Deary, Watson, & Hogston, 2003; Jones & Johnston, 1997; Pulido-Martos, Augusto-Landa, & Lopez-Zafra, 2012; Rathnayake & Ekanayaka, 2016; Rudman & Gustavsson, 2011). To prevent dropout, it seems important to focus on the mental health of student and novice nurses and to teach them how to maintain their mental health during their initial training and at the beginning of their career. According to the broad definition of the World Health Organization (WHO, 2001), mental health is defined as follows: 'a state of well-being where the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully and is able to make a contribution to his or her community' (p. 1).

Four reviews examining interventions to improve mental health of student nurses and nurses have been conducted (Galbraith & Brown, 2011; Jones & Johnston, 2000b; Ruotsalainen, Serra, Marine, & Verbeek, 2008; Ruotsalainen, Verbeek, Mariné, & Serra, 2015). All contained stress-reduction interventions, but only Galbraith and Brown (2011) and Jones and Johnston (2000b) reported on their effect on dropout-related outcomes. Likewise, several reviews have been published on retention strategies and interventions to improve the transition from novice to qualified nurse (e.g., Edwards, Hawker, Carrier, & Rees, 2015; Hayman-White, Happell, Charleston, & Ryan, 2007; Levett-Jones & FitzGerald, 2005; Park & Jones, 2010; Salt, Cummings, & Profetto-McGrath, 2008; Van Camp & Chappy, 2017; Zhang, Qian, Wu, Wen, & Zhang, 2016). These reviews, however, did not pay attention to the mental health of novice nurses – other than skill competency and self-confidence. An overview shows a lack of interventions aimed at improving the mental health of student and novice nurses to prevent dropout during training/work and their effects. Therefore, in this systematic review, we searched for interventions aimed at distress reduction to apply to student and novice nurses to retain them for the nursing profession.

3 | THE REVIEW

3.1 | Aims

The aim of this systematic review is to provide: (a) an overview of interventions aimed at improving mental health of student or novice nurses to prevent dropout during nursing education or work; and (b) evaluate their effectiveness on dropout-related outcomes.

3.2 | Design

A systematic review was conducted to comprehensively search, appraise, and synthesize research evidence (Grant & Booth, 2009) on interventions focusing on the improvement of the mental health of student or novice nurses to prevent dropout during education or work. To ensure consistency and rigour, the Cochrane handbook (Higgins et al., 2011), the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline (Moher, Liberati, Tetzlaff, & Altman, 2009), and the Synthesis Without Meta-analysis (SWiM) guideline (Campbell et al., 2020) were followed.

3.3 | Search methods

Research papers published between January 1971–February 2019 were identified from the following databases: Embase, Medline, PsycInfo, CINAHL, ERIC, the Cochrane Library, Web of Science, and Google Scholar. For the literature searches, we consulted information specialists. Specific search strategies were developed for each database (Bramer, Rethlefsen, Kleijnen, & Franco, 2017) to identify studies for this review (Supporting Information 1). We took account of the differences between databases in controlled vocabulary and syntax rules.

All the included studies' reference lists were examined to identify additional studies. In addition, the reference lists of previous relevant reviews were examined (Anderson, Hair, & Todero, 2012; Awa, Plaumann, & Walter, 2010; Edwards et al., 2015; Franklin & Lee, 2014; Galbraith & Brown, 2011; Heckemann et al., 2015; Irving, Dobkin, & Park, 2009; Jones & Johnston, 2000b; Michie & Williams, 2003; Missen, McKenna, & Beauchamp, 2014; Moscaritolo, 2009; Ruotsalainen et al., 2008, 2015; Van Daele, Hermans, Van Audenhove, & Van den Bergh, 2012; Van der Hek & Plomp, 1997; Walter, Plaumann, & Krugmann, 2013; Wardell & Weymouth, 2004).

3.4 | Search outcome

Studies were included if they met the following criteria: (a) full-text, peer-reviewed article written in English; (b) experimental quantitative or mixed-methods research design; (c) sample of student or novice nurses (≤2 years after graduation); (d) the intervention focused on improving mental health (i.e., reducing psychological distress, burnout, anxiety, or depression, or improving coping, mental resilience, or problem-solving); and (e) the outcome measures included dropout from nursing education, leaving the nursing profession in the first two years after graduation, or early indicators of dropout, such as sickness absence and intention to stay/leave. Studies that only looked at academic stressors, such as exam anxiety, or had an exclusive focus on academic self-efficacy or academic performance were excluded.

First, two review authors (EB & JK) independently screened the titles and abstracts of all references using Covidence software (Covidence, 2020). Next, full texts of all potentially eligible studies were appraised independently by the two review authors to determine whether all the inclusion criteria were met. Disagreements were resolved if possible, by discussion between these review authors and otherwise a third review author (PR) was consulted to reach consensus.

In total, 15,566 records were identified. After removing duplicates, 8,463 were left for screening. After screening titles and abstracts, 8,235 records were excluded, leaving 228 potentially relevant studies. Full-text screening of these articles showed that 212 did not meet the inclusion criteria, leaving 16 studies. Figure 1 illustrates the selection process using a modified version of the PRISMA flow diagram (Moher et al., 2009). Five additional studies (Bailey, 1984; Delaney et al., 2016; Hu et al., 2015; Owens et al., 2001; Scott & Smith, 2008) were identified by scrutinizing reference lists of 16 selected studies and 17 previous reviews (see above). Finally, 21 studies were included in this review.

3.5 | Quality appraisal

The modified Cochrane Risk of Bias tool for the quality assessment of randomized controlled trials (RCTs) (Higgins et al., 2011) was used by three reviewers (EB, CB, & PR) to independently appraise the methodological quality of the included articles and compare the results. Differences in judgements were discussed to reach consensus on the risk of bias.

3.6 | Data extraction

Data were extracted by the first author using a pre-structured data extraction sheet in Excel regarding: (1) study characteristics (country of study, number of participants, design, evaluation method, results, and outcomes); (2) intervention characteristics (intervention duration, participants' characteristics [age, gender, year of study, ethnic group], intervention components, the professionals involved); and (3) primary outcome measures as described above. Two co-authors (EB and CB) checked the extracted data.

Effectiveness of the interventions in improving the primary outcome measures was rated independently by three researchers (EB, CB, and PR). These ratings were compared with the conclusions by the authors of the included studies.

3.7 | Synthesis

Statistical pooling was not feasible due to the large variation in interventions, settings, and outcome measures of the studies. Therefore, a synthesis without meta-analysis was performed (Campbell et al., 2020). To draw conclusions about the effectiveness of the interventions, the evaluated outcome measures were classified and related to the content of the interventions.

To provide an overview of interventions aimed at improving mental health of student or novice nurses to prevent dropout during nursing education or work, the studies were first grouped by target group and type of intervention and presented in a table. To evaluate the effectiveness of the interventions, the effect sizes of the outcomes (differences in means), including the *p* value with the associated statistical test, were extracted from the studies and summarized in tables.

4 | RESULTS

4.1 | Characteristics of the studies

Of the 21 included studies, as summarized in Table 1 (and in more detail in Supporting Information 2), most were conducted in the

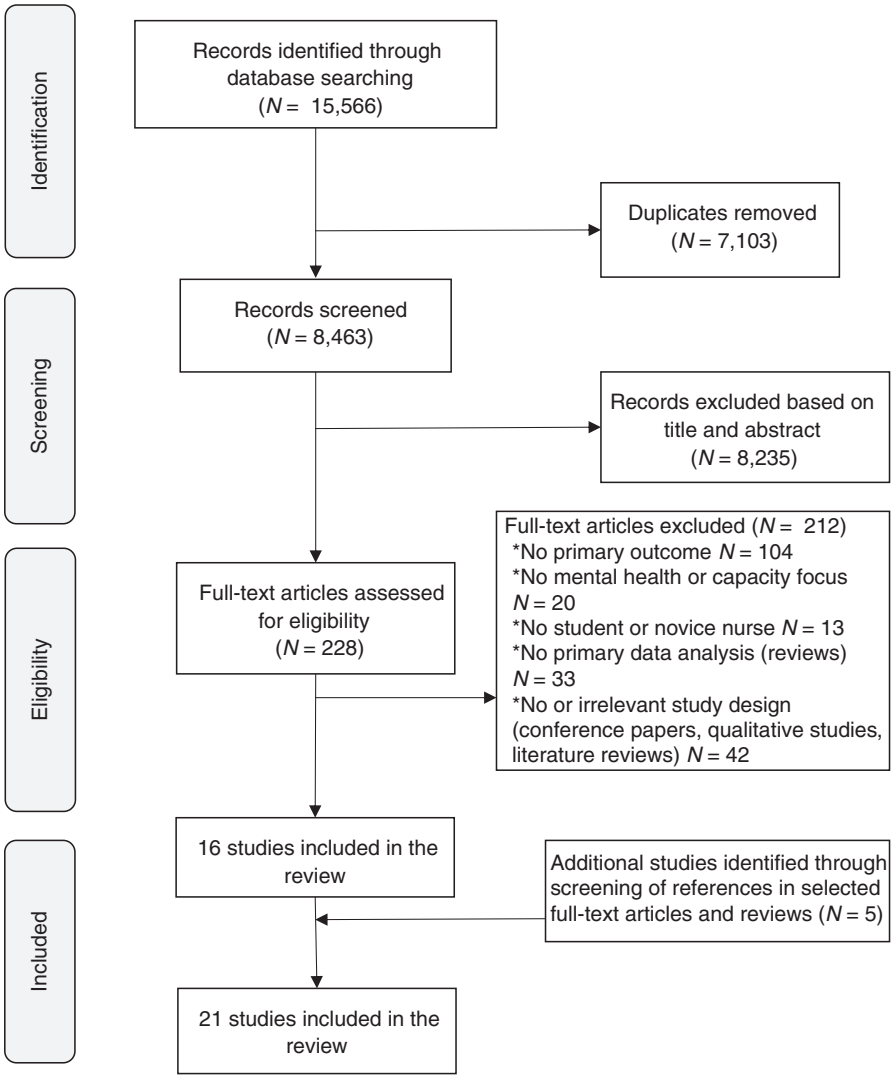

FIGURE 1 Inclusion and exclusion of articles using a modified version of the PRISMA flow diagram.

United States (*N* = 15), followed by the UK (*N* = 4), Australia (*N* = 1), and Taiwan (*N* = 1). Study design used were uncontrolled longitudinal studies (*N* = 7), controlled trials (*N* = 6), a controlled post-test measurement only (*N* = 1), uncontrolled post-test measurement only (*N* = 3), and cross-sectional designs (*N* = 2); only two randomized controlled trials were included.

Sample sizes of the studies ranged from 16 (Cubit & Ryan, 2011) to 3,484 (Williams, Scott, Tyndall, & Swanson, 2018) participants. A total of 7,067 participants were included in 19 studies; two studies did not report the exact number of participants (Krugman et al., 2006; Newhouse, Hoffman, Suflita, & Hairston, 2007). Most studies focused on novice nurses (*N* = 16); five examined student nurses. In all, 20 studies included primarily participants without mental health problems; one other study included student nurses who previously reported significant distress (Jones & Johnston, 2000a). Hu et al. (2015) included preceptors – nurses who offer a formal period of support to newly Registered Nurses (Nursing & Midwifery Council, 2002).

Student nurses were mostly female first-year Bachelor students aged between 18 and 23 with a Caucasian ethnic background. One study had excluded male students (Bailey, 1984).

Novice nurses were mostly female nurses with a bachelor's or an associate's degree and with a Caucasian ethnic background aged 23 and older, without previous work experience. Three studies did not report background characteristics (Newhouse et al., 2007; Owens et al., 2001; Scott & Smith, 2008).

All interventions for student nurses were conducted in Bachelor of Nursing programmes at institutions for higher education (*N* = 5). Most interventions for novice nurses were hospital based (*N* = 15). Roxburgh et al. (2010) targeted 97 newly graduated nurses currently practising in different settings in 14 Health Boards, with the largest number working on wards and five practising in the community.

4.2 | Quality appraisal

The methodological quality assessment of the 21 studies was assessed; all studies had considerable sources of bias (Supporting Information 3). Figure 2 summarizes the assessed risk of bias of the studies.

TABLE 1 Characteristics of the included studies

First author and year of publication, country	Study design	Participants	Intervention	Comparison	Dropout-related outcomes	Results[a]
Interventions aimed at managing stress						
Bailey (1984, UK)	Controlled trial	45 first-year student nurses	Six weekly sessions with lectures on stress, and autogenic regulation training	Lectures on stress	Sickness absence[b] (total days off) (register data)	Intervention (64 days) versus control group (92 days) $p < .001$ (Chi-square analysis)
Delaney et al. (2016, US)	Controlled trial	37 junior student nurses	Two 2½ hr sessions on developing stress management plans	A case study on communication/ stress information	Attrition (academic records)	NS (no numbers reported)
Jones and Johnston (2000a, UK)	Randomized controlled trial	79 student nurses with distress	Six 2-hours sessions on reducing distress with training in coping skills including relaxation	No intervention	Sickness, absence (archival sources)	Sickness: intervention (34%) versus control (34%) NS aabsence: intervention (30%) versus control (34%) NS
Wernick (1984, US)	Controlled trial	130 practical nursing students	Nine weekly 1-hr sessions stress inoculation training, a cognitive-behavioural approach	No intervention	Attrition[b] (data source NR)	Total attrition: intervention (29.2%) versus control group (52.3%) $p < .05$ (Chi-square analysis)
Interventions facilitating the transition to nursing practice						
Cubit and Ryan (2011, Australia)	Uncontrolled longitudinal study	16 novice nurses	A formal 1-year graduate nurse programme with a strong focus on support and socialization	Not applicable	retention[b] (data source NR)	Intervention group (88%) versus the year before (64%)
Hu et al. (2015, Taiwan)	Controlled trial	107 novice nurses	A 10-min preceptor model to decrease work stress, intention to leave, and increase work experience	Traditional preceptor model (TMP) orientation	Turnover intention[b] (self-reported, self-formulated question)	Intervention (mean = 3.87) versus control group (mean 5.06) $p = .003$ (independent samples t-test)
Jones and Johnston (2006, UK)	Controlled trial	853 first-year student nurses	A student-centred problem-based curriculum to improve well-being, performance, and reduce sickness absence	Traditional course	Number of days sickness absence (register data)	Intervention 1 (7.56) versus control (5.71), intervention 2 (8.31) versus control (5.71) $p = .003$ (one-way ANOVA)
Kowalski and Cross (2010, US)	Uncontrolled longitudinal study	55 novice nurses	1-year residency programme to increase the level of clinical competency, assist transition, decrease turnover	Not applicable	Retention[b] (data source NR)	Intervention cohort 1 (78%) versus figures as reported in the literature (90%–94%); intervention cohort 2 (96%) (incomplete data)
Krugman et al. (2006, US)	Uncontrolled longitudinal study	novice nurses (numbers NR)	1-year national post-baccalaureate programme to provide a consistent, uniform transition into practice	Not applicable	Retention[b] (data source NR)	Turnover: intervention group (8%) versus figures as reported in the literature (20%–40%)
Newhouse et al. (2007, US)	Controlled post-test only study	−/+ 492 novice nurses (total NR)	1-year internship programme aimed at social and professional reality integration	Not participating in the intervention	Retention[b] (administrative data), anticipated turnover[b] (validated instrument)	Retention: intervention (88.9%) versus control (80%) $p = .014$ (Chi-square analysis); anticipated turnover: (3.38) versus (3.60) $p = .022$ one-way ANOVA)

(Continues)

TABLE 1 (Continued)

First author and year of publication, country	Study design	Participants	Intervention	Comparison	Dropout-related outcomes	Results[a]
Olson-Sitki et al. (2012, US)	Uncontrolled longitudinal study	31 novice nurses	1-year nurse residency programme to support graduate nurses as they assume the professional role	Not applicable	Turnover[b] (data source NR)	Turnover: Intervention group 2008 (7%), 2009 (11%) versus group 2006 (15%), 2007 (12%)
Owings (2016, US)	Uncontrolled longitudinal study	121 novice nurses	1-year nurse residency programme to support a successful transition into practice, develop EBP and leadership skills	Not applicable	Turnover[b] (records maintained by nurse residency coordinator)	Turnover: intervention group 2012–2015 (15.9%) versus non-participant novice nurses 2012–2015 (29.3%)
Pelletier et al. (2019, US)	Uncontrolled longitudinal study	34 novice nurses	1-year new graduate nurse residency programme, combining a curriculum with a social support system	Not applicable	Turnover[b] (data supplied by Human Resources)	Turnover: Year 1 intervention group (11.7%), Year 2 intervention group (2.9%) versus figures reported in the literature (17.5% and 33.5%)
Roxburgh et al. (2010, UK)	Uncontrolled post-test only study	97 novice nurses	Online programme to support transition from student to novice nurse by increasing confidence and competence in first year	Not applicable	Intention to stay[b] (self-reported; self-formulated)	Intention to stay: 89.9% (no comparison)
Scott and Smith (2008, US)	Uncontrolled post-test only study	25 novice nurses	1-year group mentoring programme to gain confidence and competence in the first year	Not applicable	Intention to stay (self-formulated), turnover[b] (data source NR)	Intention to stay: 62% (no comparison); turnover: 2005 (20%) versus 2002 (30.7%), 2003 (21.7%), 2004 (26.9%)
Spector et al. (2015, US)	Randomized controlled design	1,088 novice nurses from 94 hospitals	1-year transition to practice (TTP) model programme: orientation programme, support from preceptors, and clinical online education	Other than TTP programmes	Turnover (tracked by site coordinators)	Turnover: TTP (15%) versus control (16.7%) NS ($p = .212$) (Chi-square analysis); post hoc analysis: TTP (14.7%) versus limited programmes (25%) ($p < .001$) (Chi-square)
Williams et al. (2007, US)	Uncontrolled longitudinal study	679 novice nurses in acute care	1-year postbaccalaureate residency programme to develop decision-making skills related to clinical judgement/performance	Not applicable	Turnover[b] (data source NR)	Turnover: intervention group (12%) versus figures reported in the literature (35%–55%)
Williams et al. (2018, US)	Cross-sectional study	3,484 novice nurses from 102 hospitals	One-to-one mentoring within Versant Registered Nurse residency programme	Group mentoring	Turnover intention (self-reported; self-formulated question)	Turnover intention: one-to-one mentoring (4.7%) versus group mentoring (6.2%) NS
Interventions facilitating the transition to nursing practice combined with a stress management programme component						
Beecroft et al. (2001, US)	Controlled trial	78 novice nurses	1-year RN Internship in paediatrics programme to improve confidence, competence, safe patient, and increase commitment/retention	Not reported	Turnover[b] (data source NR), anticipated turnover[b] (validated instrument	Anticipated turnover: intervention (30.98%) versus control (39.72%) at 12 months $p = .01$; turnover: intervention group (14%) versus control group (36%)

(Continues)

TABLE 1 (Continued)

First author and year of publication, country	Study design	Participants	Intervention	Comparison	Dropout-related outcomes	Results[a]
Messmer et al. (2011, US)	Uncontrolled post-test only study	33 novice paediatric nurses	one 2- or 3-hr session to help new nurses to adjust to a new environment with role-playing/problem-solving/stress reduction	Not applicable	Turnover rate[b] (data source NR), intention to stay[b] (self-formulated questions)	Turnover: intervention group (8%) versus figures reported in the literature (20%–40%); Intention to stay: 88% (no comparison)
Owens et al. (2001, US)	Uncontrolled post-test only study	75 novice nurses	8-week new graduate RN internship with didactic information, precepted clinical experience, and competency-based learning	Not applicable	Retention[b] (data source NR)	Retention: July group (88%) and September group (88%) versus figures reported in the literature (35%–60%)

Abbreviations: NR, not reported; NS, no statistically significant difference.

[a]When available, *p* values and statistical test used are given from the original studies.

[b]Primary outcome of study.

4.3 | Types of interventions

The 21 studies described three different types of interventions aimed at: (i) managing stress; (ii) facilitating the transition to nursing practice; and (iii) a combined approach (Table 2).

4.3.1 | Interventions aimed at managing stress

All four interventions aimed at managing stress targeted nursing students only (Bailey, 1984; Delaney et al., 2016; Jones & Johnston, 2000a; Wernick, 1984). All stress management programmes were carried out in an educational setting and included group sessions, but they differed in content, duration, intervention provider, and outcomes. One intervention contained relaxation skill training including education, discussion, and practical training (Bailey, 1984). The other three involved education and skill training in coping with stress and stressors combined with relaxation skills training and cognitive-behavioural therapy techniques, such as cognitive reappraisal. The duration varied from two 2.5-hr sessions (Delaney et al., 2016) to six 2-hr sessions (Jones & Johnston, 2000a). Interventions were provided by nursing faculty members (Delaney et al., 2016), psychology interns, social workers and graduate students (Wernick, 1984), autogenic relaxation therapy practitioners (Bailey, 1984), or were not reported (Jones & Johnston, 2000a).

4.3.2 | Interventions facilitating the transition to nursing practice

This type of interventions was mostly redesigned internship, new-graduate, retention, or residency programmes aimed at supporting novice nurses in the first period of nursing practice to improve retention. These interventions were programmes where support from a professional (mentor, preceptor, nurse facilitator) and/or support from peers was combined with clinical nursing education (mainly classroom, skill training, and/or simulation) (Cubit & Ryan, 2011; Kowalski & Cross, 2010; Krugman et al., 2006; Newhouse et al., 2007; Olson-Sitki, Wendler, & Forbes, 2012; Owings, 2016; Pelletier, Vincent, Woods, Odell, & Stichler, 2019; Scott & Smith, 2008; Spector et al., 2015; Williams, Goode, Krsek, Bednash, & Lynn, 2007; Williams et al., 2018). Most interventions were broad programmes with different components. Two consisted of a single component: a 10-min preceptorship intervention with professional support (Hu et al., 2015) and a digital educational programme for novice nurses (Roxburgh et al., 2010). Only one intervention was found for nursing students; this was a student-centred problem-based curriculum with professional and peer support (Jones & Johnston, 2006). Interventions varied in duration between 6 months and 1 year. They were mostly applied at both the individual and group levels. Two interventions just addressed individuals (Hu et al., 2015; Roxburgh et al., 2010). Most interventions were provided by nurses or nurse specialists in the role of mentor, preceptor, coach, and/or lecturer.

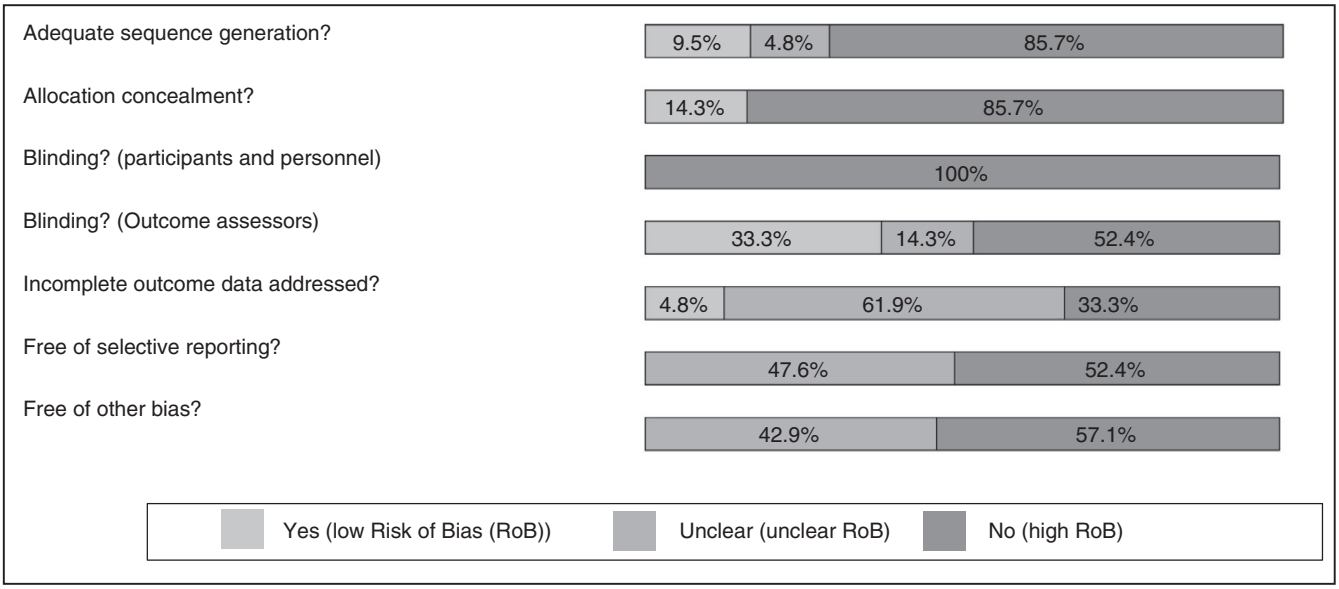

FIGURE 2 Assessment of the methodological quality of each item, presented as percentages across all 21 studies.

TABLE 2 Intervention characteristics and components

	Stress management focus			Transition focus		
	Cognitive-behavioural	Relaxation	Self-care/Coping	Clinical education	Professional support	Peer support
Studies with interventions aimed at student nurses						
Bailey (1984)		x				
Delaney et al. (2016)	x	x	x			
Jones and Johnston (2000a)	x	x	x			
Jones and Johnston (2006)				x	x	x
Wernick (1984)	x	x	x			
Studies with interventions aimed at novice nurses						
Beecroft et al. (2001)			x	x	x	x
Cubit and Ryan (2011)				x	x	x
Hu et al. (2015)					x	
Kowalski and Cross (2010)				x	x	x
Krugman et al. (2006)				x	x	
Messmer et al. (2011)			x			x
Newhouse et al. (2007)				x	x	x
Olson-Sitki et al. (2012)				x	x	x
Owens et al., 2001			x	x	x	
Owings (2016)				x	x	x
Pelletier et al. (2019)				x	x	
Roxburgh et al. (2010)				x		
Scott and Smith (2008)					x	x
Spector et al. (2015)				x	x	
Williams et al. (2007)				x	x	
Williams et al. (2018)					x	

4.3.3 | Interventions with a combined approach

Of the 17 interventions facilitating the transition to nursing practice, three contained a clear stress management component with educational group sessions for skill training in coping with stress and stressors (Beecroft, Kunzman, & Krozek, 2001; Messmer, Bragg, & Williams, 2011; Owens et al., 2001). All interventions targeted novice nurses. They varied in duration from one 2 - 3-hr session to several

TABLE 3 Overview of the effectiveness of the interventions

First author (year)	Dropout	Sickness absence	Intention to leave	Effectiveness as described in studies
Stress management focus, student nurses				
Bailey (1984)		+		+
Delaney et al. (2016)	NS			NS
Jones and Johnston (2000a)		NS		NS
Wernick (1984)	+			+
Transition focus, student nurses				
Jones and Johnston (2006)		–		–
Transition focus, novice nurses				
Cubit and Ryan (2011)	?			+
Hu et al. (2015)			+	+
Kowalski and Cross (2010)	?			+
Krugman et al. (2006)	?			+
Newhouse et al. (2007)	?		+	+
Olson-Sitki et al. (2012)	?			+
Roxburgh et al. (2010)			?	+
Scott and Smith (2008)			?	+
Williams et al. (2007)	?			+
Owings (2016)	?			+
Pelletier et al. (2019)	?			+
Spector et al. (2015)	NS/+			NS/+
Williams et al. (2018)			NS	NS
Transition focus with stress management component, novice nurses				
Beecroft et al. (2001)	?		+	+
Messmer et al. (2011)	?		?	+
Owens et al. (2001)	?			+

Abbreviations: –, Negative significant effect; ?, Unclear effect; +, Positive significant effect; NS, No statistically significant effect; statistical significance not measured/no comparison/no numbers reported.

sessions over 1 year. One intervention was applied at the group level (Messmer et al., 2011); the other two were applied at both the individual level and the group level (Beecroft et al., 2001; Owens et al., 2001). Two interventions were provided by nurses or nurse specialists in the role of mentor, preceptor, coach, and/or lecturer (Beecroft et al., 2001; Owens et al., 2001); one by a clinical psychologist (Messmer et al., 2011).

4.4 | Outcomes

4.4.1 | Dropout-related outcomes

Found primary outcomes of interest were as follows: retention (Cubit & Ryan, 2011; Kowalski & Cross, 2010; Krugman et al., 2006; Newhouse et al., 2007), turnover in the nursing workforce (Beecroft et al., 2001; Messmer et al., 2011; Olson-Sitki et al., 2012; Owings, 2016; Pelletier et al., 2019; Scott & Smith, 2008; Spector et al., 2015; Williams et al., 2007), and attrition from nursing education (Delaney et al., 2016; Wernick, 1984). Other outcomes of interest were early indicators of dropout such as absence (Jones & Johnston, 2000a), sickness absence (Bailey, 1984; Jones & Johnston, 2000a, 2006), and self-reported intention to stay/leave (Bailey, 1984; Hu et al., 2015; Newhouse et al., 2007; Roxburgh et al., 2010; Scott & Smith, 2008; Williams et al., 2018). In the following sections and Table 3, the outcomes 'retention', 'attrition', and 'turnover' have been converted into dropout figures and 'intention to stay' into 'intention to leave'.

4.4.2 | Other outcome measures

Besides dropout-related outcomes, five other types of outcomes were presented in the included studies: mental health/well-being, behavioural characteristics, academic performance, professional performance, and job/work environment (see Supporting Information 2).

4.5 | Effectiveness of the interventions

Table 3 summarizes the effectiveness of the interventions. Five studies (Bailey, 1984; Beecroft et al., 2001; Hu et al., 2015; Newhouse et al., 2007; Wernick, 1984) showed a statistically significant effect on one of the dropout-related outcomes.

4.5.1 | Dropout

In all, 11 studies measured the effect of the intervention on dropout. Of these 11 studies, two concerned interventions aimed at managing stress or stressors for student nurses. A programme including three components (cognitive-behavioural therapy techniques; relaxation skill training; and skill training in self-care/coping with stress and stressors) led to a decrease in total attrition and attrition for personal reasons, but not in attrition due to academic reasons (Wernick, 1984). The other programme, only including skill training in coping with stress and stressors, showed no statistically significant effect on attrition (Delaney et al., 2016).

Most of the interventions aimed at facilitating the transition to nursing practice for novice nurses showed an unclear effect on retention (Cubit & Ryan, 2011; Kowalski & Cross, 2010; Krugman et al., 2006; Newhouse et al., 2007; Olson-Sitki et al., 2012; Owings, 2016; Pelletier et al., 2019). Six studies lacked a control group and compared dropout or retention rates with numbers reported in the literature (Kowalski & Cross, 2010; Krugman et al., 2006; Messmer et al., 2011; Owens et al., 2001; Pelletier et al., 2019; Williams et al., 2007). Four studies (Cubit & Ryan, 2011; Olson-Sitki et al., 2012; Owings, 2016; Scott & Smith, 2008) compared post-test dropout or retention rates with rates in previous years without comparing the characteristics of the groups in question (e.g., age, gender, educational background, work experience) and/or describing clearly which changes were made in the intervention programme. An exception was the study by Newhouse et al. (2007), reporting a statistically significant difference in retention in the intervention group at 12 months, but no statistically significant difference in retention at 18 and 24 months. In a multicentre study of Spector et al. (2015), no statistically significant differences in turnover were found between hospitals with an evidence-based Transition to Practice (TTP) Model programme and hospitals with other programmes. Only after additional post-hoc analyses – hospitals in the control group were categorized as having established or limited programmes – some differences were detected.

Three interventions facilitating the transition to nursing practice with a stress management component targeting novice nurses (Beecroft et al., 2001; Messmer et al., 2011; Owens et al., 2001) showed unclear effects on retention and differed substantially in content and duration, which impeded comparing one with another. The intervention studied by Beecroft et al. (2001) contained all three components (clinical education, professional support, and peer support) plus a stress management component; the turnover rate for the control group (36%) was two and a half times higher than that of the intervention group (14%), statistical significance of differences between intervention and control group was not calculated. Finally, Messmer et al. (2011) compared the turnover rate of 8% with rates reported in the literature (20%–40%). Owens et al. (2001) compared a retention rate of 88% with rates reported in the literature (35%–60%).

4.5.2 | Sickness absence

Three studies measured the effect of the intervention on sickness absence. Bailey (1984) reported a statistically significant difference of 28 days (total days off) in favour of the intervention group (student nurses who were offered relaxation skill training only). No statistically significant differences in sickness absence were reported by Jones and Johnston (2000a), who studied the effect of their multicomponent intervention (cognitive-behavioural therapy techniques, relaxation, and self-care/coping skill training) on 79 student nurses previously reporting significant distress. Their intervention, however, had statistically significant beneficial effects on emotional distress and increased adaptive coping use in both clinical and academic settings.

In the third study (Jones & Johnston, 2006), with an intervention aimed at facilitating the transition to nursing practice through curriculum redesign (from traditional to student-centred problem-based) with professional and peer support targeting 853 first-year nursing students, a statistically significant adverse effect of approximately 2 days on sick leave was detected, despite a statistically significant decrease in distress. The authors' explanation of this adverse effect is that the new curriculum may have partly removed the need for students to attend classes. It also can be explained by an increased awareness about the importance of not attending classes when feeling unwell.

None of the studies with interventions facilitating the transition to nursing practice with a stress management component targeting novice nurses measured sickness absence.

4.5.3 | Intention to leave

Seven of 21 studies measured the effect on intention to leave; two with a combined approach and five with a transition focus. Of these five, two found a beneficial effect on intention to leave among novice nurses in a hospital setting. One was an intervention targeting 107 novice nurses and consisting of 10 min' support from a preceptor at the beginning and end of every shift for 1 year (Hu et al., 2015). The other was a 2-year new-graduate programme with clinical education, peer support, and guidance from a mentor (Newhouse et al., 2007).

An unclear effect was found in two of the five nursing transition interventions. One was a web-based CD-ROM programme to

improve clinical, professional, interpersonal, and stress management skills, targeting 97 novice nurses in various settings (Roxburgh et al., 2010). The other was a 1-year group mentoring programme with professional and peer support (Scott & Smith, 2008). Both studies lacked a control group and a pre-test measurement of intention to leave.

The fifth study (Williams et al., 2018) showed no statistically significant difference on intention to leave between individual and group mentoring, one component of a retention programme for novice nurses.

In the uncontrolled post-test study by Messmer et al. (2011), we found an unclear effect of a 2 - 3-hr session, consisting of self-care/coping skill training with special attention to stress and stressors among novice nurses, since a baseline measurement was missing. A controlled trial on a 1-year pilot programme, with clinical education, mentor and preceptor support, peer support and debriefing, and self-care sessions for discussing difficulties encountered during the internship and for providing strategies to deal with them, showed a beneficial effect on intention to leave (Beecroft et al., 2001). No studies on interventions aimed at managing stress or stressors measured this outcome.

5 | DISCUSSION

This systematic review identified three types of interventions: interventions aimed at managing stress, interventions facilitating the transition to nursing practice, and interventions with a combined approach. Most of the studies targeting student nurses involved interventions aimed at managing stress, including cognitive-behavioural therapy techniques, relaxation, and self-care/coping skill training. Studies targeting novice nurses mainly involved interventions aimed at facilitating the transition to nursing practice, including education, professional, and peer support. Although the authors of most these studies clearly underlined the importance of decreasing stress and anxiety among novice nurses, only three programmes contained a stress management component: self-care/coping skill training.

We found some indications that a stress management intervention with a relaxation component (Bailey, 1984) might be effective in reducing sickness absence and a stress management intervention including cognitive-behavioural therapy techniques, relaxation, and self-care/coping skill training (Wernick, 1984) might be effective in preventing dropout among nursing students. However, these studies were published in 1984 (36 years ago). Although there is more recent evidence for the effectiveness of these mechanisms in managing stress (e.g., Galbraith & Brown, 2011), nursing educational programmes, the intervention population itself (Barren McBride, 1999; Morin, 2014), and consequently the stressors such as work pressure due to unfulfilled job vacancies (de Jong et al., 2014; Wismar et al., 2018) faced by student and novice nurses likely have changed. So, these interventions would not necessarily be effective if implemented as such today.

Furthermore, we found some indications that interventions aimed at facilitating the transition to nursing practice with or without a stress management component are effective in improving retention or intention to stay (Beecroft et al., 2001; Hu et al., 2015; Newhouse et al., 2007; Spector et al., 2015). Most of the studies however, showed no, an unclear, or an adverse effect. Besides, most of these interventions were developed for the clinical setting, mostly general and one psychiatric hospital (Pelletier et al., 2019). We found no interventions for novice nurses working in long-term mental health, disability, elderly or home care, or health care for the homeless. Only one study (Roxburgh et al., 2010) included novice nurses from non-hospital-based settings such as community care. However, a recent study indicated that intended and actual dropout among younger nurses in home and elderly care is higher than in hospital care (Bratt & Gautun, 2018). These groups deserve more attention in future intervention studies.

5.1 | Risk of bias in included studies

In general, an overall high risk of bias was found in all studies. Design problems included: recruitment of small samples leading to lack of statistical power (Delaney et al., 2016) and poor comparisons due to the absence of baseline measurements and control groups (Cubit & Ryan, 2011; Kowalski & Cross, 2010; Krugman et al., 2006; Messmer et al., 2011; Olson-Sitki et al., 2012; Owens et al., 2001; Owings, 2016; Pelletier et al., 2019; Roxburgh et al., 2010; Scott & Smith, 2008; Williams et al., 2007). In some articles, the statistical test used was not reported, or *p* values were not reported or reported without indicating the effect size, therefore making the *p* value not easily interpretable. Besides, in most studies, no comparison was made between groups with complete and groups with incomplete data. This is in line with previous reviews on strategies and interventions to improve the transition from student to newly qualified nurse (e.g., Brook, Aitken, Webb, MacLaren, & Salmon, 2019; Edwards et al., 2015; Salt et al., 2008), where limitations were also reported in the methodological quality of the included studies.

Most of the studies included in this review measured one of our outcomes of interest (intention to leave/stay) with self-formulated questions, which may be prone to response bias. Although measures of our main outcome of interest (attrition, turnover, and retention) were generally based on more objective data, such as register data and academic records, not all studies reported the data source. Besides, there were differences in the definition and operationalization of our main outcome of interest, dropout. In studies among student nurses, the term 'attrition' was commonly used to refer to dropout. Some studies distinguished between voluntary attrition (exit due to personal reasons) and involuntary attrition (forced exit, e.g., due to academic failure). None of the studies reported whether dropout meant leaving this nursing programme or a future nursing career. For the availability of nurses in the field, this distinction is relevant. The study of Wernick (1984) also shows the importance of this distinction; the intervention was effective in decreasing dropout for personal reasons but not for

academic reasons. In studies conducted in the United States, involuntary turnover usually meant failing the national NCLEX-RN exam, which is taken within the first 6 months of work as a newly graduated nurse. Some studies excluded cases of involuntary dropout (Beecroft et al., 2001; Williams et al., 2007) and other studies solely focused on retention. The study of Wernick (1984) highlights the need for not excluding these respondents but to include different aspects of dropout when investigating an intervention effect, such as voluntary or involuntary dropout and to monitor academic and clinical performance in addition to dropout. Moreover, since not all studies distinguish voluntary and involuntary attrition or turnover, dropout numbers and intervention effect sizes are difficult to compare between studies, programmes, and countries. This problem has been reported before (e.g., Glossop, 2001; Urwin et al., 2010), but still applies.

5.2 | Strengths and limitations

This study gives a systematic overview and assessment of interventions aimed at improving the mental health of student and novice nurses to prevent dropout from nursing education and work. We looked at both student and novice nurses; two vulnerable groups for dropout (e.g., Edwards et al., 2015; Eick, Williamson, & Heath, 2012; Galbraith & Brown, 2011; Salt et al., 2008) and stress, anxiety, and burnout (e.g., Jones & Johnston, 2000b; Pulido-Martos et al., 2012; Spence Laschinger & Fida, 2014). This systematic and sensitive search is a potential strength. On the other hand, to structure our results, we grouped together interventions that were heterogeneous in content. The diversity of the interventions and evaluation study designs hindered a comparison of the studies, data pooling, and meta-analysis. Furthermore, we included all studies with some mental health focus that also measured dropout-related outcomes. However, these outcomes were not necessarily the primary outcome of the study intervention. We might therefore have underestimated the effect of the intervention because the reason for finding no statistically significant effect could also be that the study had limited focus or power for that. We searched for interventions aimed at improving mental health to reduce dropout. We know, however, that dropout can be related to factors other than poor mental health, for example academic failure, physical health, and family–work imbalances. Another limitation was that we restricted to articles published in English, which might have resulted in relevant studies being missed.

6 | CONCLUSION

Three different types of interventions were found. The evidence for the effectiveness of these interventions is limited. Due to the large variation in interventions, intervention populations, settings, and outcome measures, we were unable to compare groups of interventions and the effects on our outcomes of interest. Five studies reported significant effects on dropout or dropout-related outcomes, but they also showed a high risk of bias.

There is a need for high-quality studies characterized by sufficient statistical power and controlled designs, with a clear description of the theoretical foundations, working mechanisms, and components of the interventions. It is therefore recommended that the methods and measures used in this field should be harmonized. There is a need for more evidence on interventions aimed at retaining student and novice nurses in their profession by improving their mental health. Any evaluation of programmes aimed at facilitating the transition from novice nurse to advanced beginner needs to involve a controlled study design and larger study populations. To compare the effects of different interventions, uniform definitions of educational/work dropout should be used, along with validated instruments.

To support the transition from novice nurse to advanced beginner in non-hospital settings, interventions should be developed for and tested on novice nurses in long-term mental health, disability, elderly or home care or health care for the homeless. Considering the high demand for nurses globally, interventions with a focus on the mental health of student nurses should also include measures for preventing dropout when being developed.

For education and practice, it is necessary to be aware of the gaps of knowledge on this topic and opportunities to improve the curricula and transition to work. Addressing the complex 'Gordian knot' of retention (Bakker et al., 2018, 2019; Sabin, 2012) requires multiple strategies. An example of a strategy is one where students, educators, researchers, and healthcare staff cooperate in longitudinal monitoring of nursing students' mental and physical well-being beyond graduation to deploy targeted interventions.

PEER REVIEW

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CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

AUTHORS' CONTRIBUTIONS

All authors have made substantial contributions to all of the following: (a) conception and design of the study, acquisition of data, or analysis and interpretation of data, (b) drafting the article or revising it critically for important intellectual content, and (c) approval of the final version of the manuscript.

ORCID

Ellen J. M. Bakker https://orcid.org/0000-0002-5706-8220

TWITTER

Ellen J. M. Bakker @ejmbakker
Jos H. A. M. Kox @joskox
Anneke L. Francke @FranckeA
Pepijn D. D. M. Roelofs @pepijn_roelofs

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